

# Research-Based Curricula



**Hormones made me do it!**  
Key Stage 3  
Biology

**2022**

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# About this Pack

## Who is this pack for?



- This pack was created for all students, regardless of whether this is your best or worst subject.
- It's not graded or marked by your teacher. It's a chance to explore the subject and learn in a new way that's different to the classroom.
- Each pack is written by a student at the University of Reading researching this topic and has special knowledge on the subject. When they were your age, they knew nothing about it either!
- By completing their mini-course, you will find out why it's interesting, and you will build the skills that help you improve at school.

## So... why complete this pack?



- Learn new cool areas of a subject that you won't cover in the classroom
- Sharpen your academic skills, like short essay writing and interpreting data
- Experience what it's like to explore a subject freely
- Better understand what you enjoy and don't – it will help you make decisions about your future studies and career choices!

## What's in this booklet?



Your RBC booklet is a pack of resources containing:

- ✓ More about how and why study this subject
- ✓ Four 'resources' each as a lesson with activities
- ✓ A final assignment to gauge learning
- ✓ Extra guidance throughout about the university skills you are building
- ✓ End notes on extra resources and where to find more information

# Meet the Author



**Name** Janine Dovey

**Area of Study and Degree** PhD in Behavioural Neuroendocrinology

**University** University of Reading

## Where I am from

I'm from Wolverhampton, in the West Midlands. In 2015, I moved to Cardiff, where I completed my undergraduate and Master's degree. In 2019, I moved to Reading for my PhD.

## I think my subject is awesome because...

It marries two parts of science I enjoy: neuroscience (the brain) and endocrinology (our hormones). Behavioural Neuroendocrinology helps us understand the biological reasons for our behaviours and emotions.

## At school, I studied...

**GCSE:** Biology, Chemistry, Physics, Maths, English, Drama, Music, History, I.T. and French.

**A Level:** Biology, Chemistry, Maths.

## A resource that inspires me...

The Soph Talks Science blog is fascinating, with many blog posts about science, women in STEM, and life as a scientist outside of universities. [This blog post](#) talks about how we can encourage more women to study and work in STEM, and it makes me proud to be a female scientist.

## One person I admire is...

Two people, actually – my lab colleagues, also doing their PhD. I love that we can work together, laugh together, and get through each day of experiments with each other!

# Building Your Skills

Research-Based Curricula packs challenge you to build your skills in this subject and be used across any of your schoolwork.



**Any time you see a badge, look out for a skill you'll be building!**

These skills are the type of skills that teachers and universities look for as you progress, so see how many you know below.

## Skills you may see and use in this pack.

**Research** *your ability to work on your own and find answers online or in other books*

**Creativity** *your ability to create something original and express your ideas*

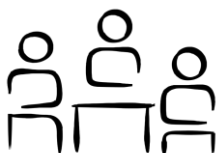
**Problem solving** *your ability to apply what you know to new problems*

**Source analysis** *your ability to evaluate sources (e.g. for bias, origin, purpose)*

**Data analysis** *your ability to discuss the implications of what the numbers show*

**Active reading** *your ability to engage with what you are reading by highlighting and annotating*

**Critical thinking** *your ability to think logically to build an argument clearly*

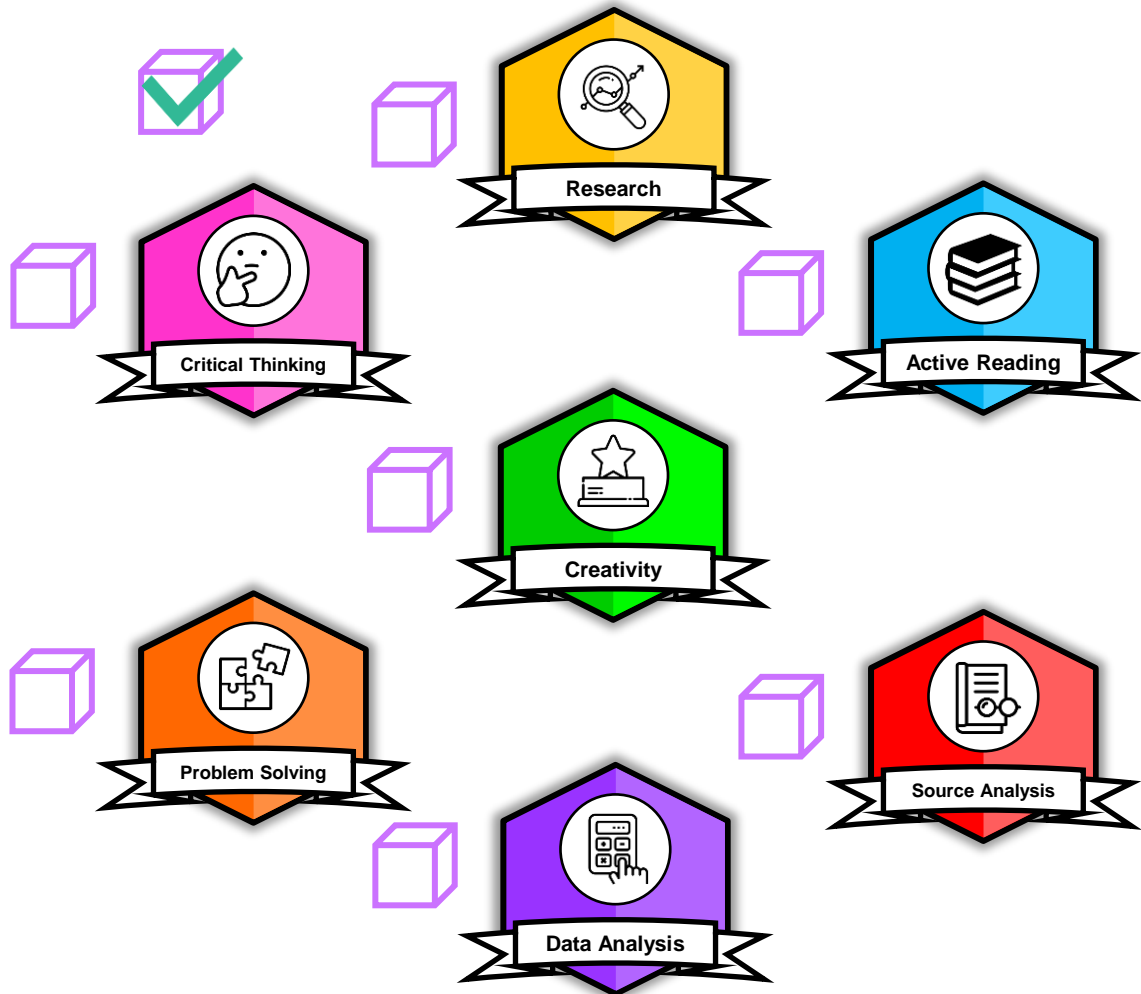


**Psst! You can learn more about these skills in the Academic Study Skills section.**

# Your Skills Badges

As you work through this booklet, you'll have the chance to build the skills you have read on the previous page.

Make sure to revisit this page once you have mastered each skill. Tick off each skills badge below once completed!



Look out for these badges in the Data Source, Activities and Further Reading sections of each Resource. If you complete a skill more than once, write the number of times you completed it next to the badge.

When you've earned all seven skills badges, you can discuss with your teacher how to further build your skills!

# Vocabulary

Be sure to use this section as you go through your booklet. If you see an emboldened word, you can find the definition here. If you are still unsure about the meaning or use of the word, we encourage you to use a dictionary or ask a teacher. See page 9 to add your own words.



Term	Definition
<b>Autocrine signalling</b>	A way in which hormones travel around the body to send messages. In autocrine signalling, the hormone acts the same cell/ tissue that produced it.
<b>Axons</b>	An extension from a neuron responsible for carrying messages through the brain.
<b>Axoplasm</b>	The specialised cytoplasm (the thick fluid inside a cell) found within axons.
<b>Cell membrane</b>	A semipermeable membrane that separates and protects the inside of the cell from the outside environment.
<b>Cholesterol</b>	A fatty substance found in food and also produced by the liver is essential to producing sex hormones.
<b>Circulatory system</b>	A collective name for the blood vessels (veins, arteries, and capillaries) that circulate blood around the body.
<b>Dendrites</b>	Extensions from neurons that receive messages from axons.
<b>Dendritic spines</b>	Even smaller extensions from the dendrites.
<b>Diffuse</b>	The movement of a substance from an area of high concentration to an area of low concentration, usually across a cell membrane.
<b>Dopamine</b>	A chemical released by the brain when we anticipate a reward. The “feel good” chemical.

# Vocabulary

Term	Definition
<b>Endocrine signalling</b>	A way in which hormones travel around the body to send messages. In endocrine signalling, the hormone travels through the bloodstream to act on a cell/ tissue far away from the cell/ tissue that produced it.
<b>Endocrine system</b>	A collective name for all the glands that make and release hormones into the blood.
<b>Enzymes</b>	A substance that initiates specific biochemical reactions in a synthetic pathway.
<b>Gland</b>	Any organ that releases biochemicals, such as hormones.
<b>Hypothalamus</b>	A region of the brain between the temporal lobe and the brainstem, which is responsible for integrating messages from the body.
<b>Integrated</b>	To bring everything together. In terms of the brain, the hypothalamus integrates messages because it puts together all the messages from the body and the rest of the brain.
<b>Mixed emotion understanding</b>	Understanding that a scenario can lead to experiencing mixed emotions at the same time, i.e. emotions that are totally opposite, such as happiness and sadness.
<b>Motivated behaviour</b>	A behaviour that is driven by a reward or some other goal.
<b>Myelin sheath</b>	The layer of cells surrounding the axon that allows the axon to transmit messages quicker.
<b>Neuronal circuit</b>	A group of interconnected neurons that carry out a specific function when activated.
<b>Estrogen</b>	A hormone produced by the ovaries – the female reproductive organs.
<b>Paracrine signalling</b>	A way in which hormones travel around the body to send messages. In paracrine signalling, the hormone acts on a cell/ tissue nearby to the cell/ tissue that produced it.



# Vocabulary

Term	Definition
<b>Pituitary gland</b>	One of the endocrine glands in the brain. The hypothalamus controls the release of hormones from the pituitary gland.
<b>Receptors</b>	A molecule on the surface of a cell (or inside the cell) that binds to a specific substance to cause a specific effect within the cell.
<b>Sex hormones</b>	The hormones released from our reproductive glands: the ovaries and the testes.
<b>Sexually dimorphic</b>	A feature or characteristic that differs between males and females of the same species.
<b>Specialised</b>	[A cell] designed to carry out a particular role in the body.
<b>Synthetic pathway</b>	A series of biochemical reactions that produce a specific hormone.
<b>Testosterone</b>	A hormone released from the testes, the male reproductive organs.

# Introduction to Subject

## Behavioural Neuroendocrinology

Behavioural Neuroendocrinology combines neuroscience (the brain) with endocrinology (our hormones) to understand how our hormones change our behaviour. Behavioural Neuroendocrinology is a major topic in both Biology and Psychology.

**The topics within this pack will include:**

**Hormones** *Where hormones are made, how they travel around the body, and what they do.*

**The brain** *The brain's anatomy and the structure of the cells in the brain.*

**How hormones facilitate brain development** *Focussing on two main hormones: estrogen and testosterone, and understanding how they change the brain's circuitry.*

**The adolescent brain** *Understanding how your brain changes during puberty.*

**Behavioural neuroendocrinology in puberty** *Understanding how the effects of hormones during puberty can change how you behave as a teenager.*

# Resource One

## Overview

**Topic** What is a hormone?

**Key Stage 3 Subject Area** **Biology:** Hierarchical organisation of multicellular organisms: From cells to tissues to organs.

**Objectives** **By completing this resource, you will be able to:**

- ✓ Understand that hormones act as chemical messengers.
- ✓ Describe how hormones access different parts of the body.
- ✓ Identify the positions of glands within the body.

**Instructions**

1. Read the data source
2. Complete the activities
3. Explore the further reading
4. Move on to Resource Two



# Resource One

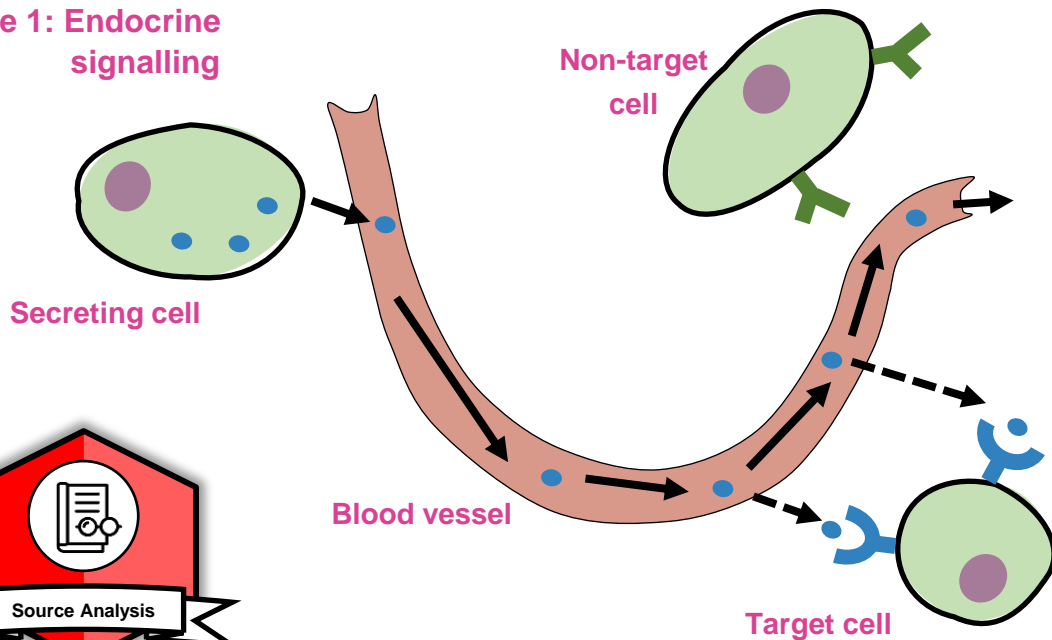
## Data Source

### Section A

### Hormone signalling

Hormones are chemicals made by **glands** in your **endocrine system** that are key to ensuring your body develops and functions as it should. To ensure our organs get the message, hormones must travel to them. To do this, they travel through the **circulatory system**, acting on cells in organs far away from the cell that made the hormone. This is **endocrine signalling**, and the primary way hormones travel through your body.

Figure 1: Endocrine signalling



Sometimes hormones act on cells that are nearby without travelling through the bloodstream. This is called **paracrine signalling**. If a hormone acts on the same cell that produced it, it's called **autocrine signalling**. Hormones know which cells to target because cells express **receptors**. Receptors are specific to each hormone, meaning they only bind one hormone. For example, the **estrogen** receptor only binds to estrogen. After a hormone has bound to a receptor, the cell initiates a response.

# Resource One

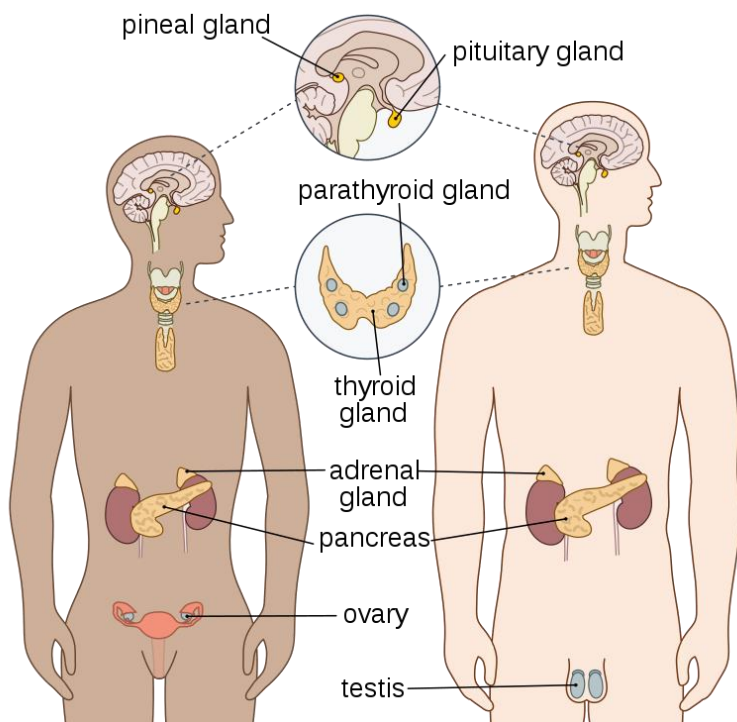
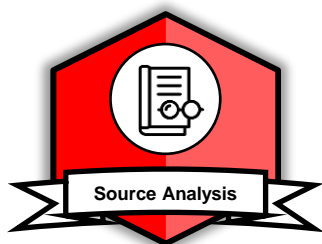
## Data Source

### Section B

#### The endocrine system

Figure 2 shows all the endocrine glands in your body. Notice that some of these glands are in your brain. Each gland produces different hormones to bring about different effects. For example, your adrenal gland releases a hormone called cortisol when you are stressed. Cortisol releases glucose from your body's energy stores to help you either fight or run away from the thing that is stressing you out.

Figure 2: The endocrine system



Another important hormone is estrogen. Estrogen is released from the ovaries – but males have estrogen, too, just in smaller amounts! A lot of research shows that the brain can also make estrogen. Brain estrogen is important for proper brain development, brain health, and regulating our behaviours and emotions.

# Resource One

## Activities

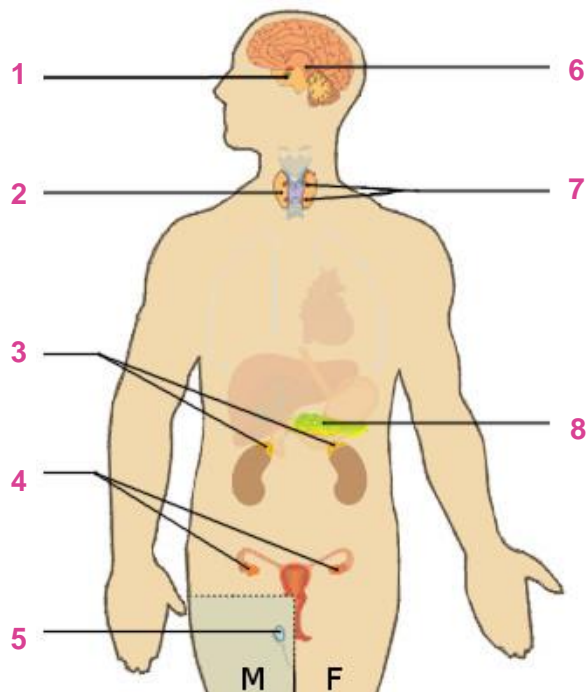
### Activities

- Match the following descriptions to paracrine, autocrine, and endocrine signalling:
  - Hormones act on cells nearby to the ones that produced them.
  - Hormones are transported by blood to act on cells far away.
  - Hormones act on the same cell that produced them.
- Based on what you know about signalling mechanisms, order each mechanism from slowest to fastest:
 

Autocrine

Endocrine

Paracrine
- How do hormones know which target cells or tissues to act on?
- Label each endocrine gland on the diagram below.



# Resource One

## Further Reading

- Explore**
- <https://www.visiblebody.com/learn/endocrine/hormones>  
Read section 1 and watch the short video clips.
  - <https://my.clevelandclinic.org/health/articles/22464-hormones>  
This is a long article, take your time in reading it and make notes.
  - <https://www.youtube.com/watch?v=KsBgcEvihS8>  
A song to help you remember the endocrine glands!

- References**
- Hiller-Sturmhöfel, S. and A. Bartke (1998). 'The Endocrine System: An Overview.' Alcohol Health Res World, 22(3). <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6761896/>

- Image Sources**
- Figure 2: [https://en.wikipedia.org/wiki/Endocrine\\_system](https://en.wikipedia.org/wiki/Endocrine_system)
  - Activity 4: <https://www.free-anatomy-quiz.com/endocrineQs1.html>

# Resource **Two**

## Overview

**Topic** An introduction to Neurobiology

**Key Stage 3 Subject Area** **Biology:** Understand that cells are the fundamental unit of living organisms.

**Objectives** **By completing this resource, you will be able to:**

- ✓ Label and define the main areas of the brain.
- ✓ Understand that a neuron is one of the main cell types in the brain, and identify the main features of a neuron.
- ✓ Describe the brain's vascular network and how it transports hormones and other biochemicals.

- Instructions**
1. Read the data source
  2. Complete the activities
  3. Explore the further reading
  4. Move on to Resource Three





# Resource Two

## Data Source

### Section A

#### Anatomy of the brain



The brain is a complex organ that controls every movement, thought, emotion and memory you have, including all the things you do not have to think about, like breathing, body temperature, and hunger. It's a very powerful organ – it can produce enough electricity to power a light bulb!

The brain is mainly made of fat and has a texture like firm jelly. It has three parts: the cerebrum, cerebellum, and brain stem. The cerebrum (the wrinkly part of the brain) is split into several lobes, each having different functions, as shown below.

Figure 3: Anatomy and functions of the brain

#### The Cerebrum: Frontal Lobe

Controls personality, thinking, planning, problem solving

#### Language and reading

#### The Cerebrum: Parietal Lobe

Controls movement, sensations (pain, taste, touch, etc.), speed, and writing.

#### The Cerebrum: Occipital Lobe

Controls memory, sight, and smell

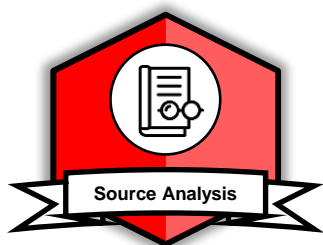
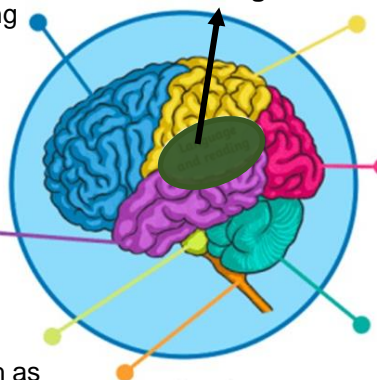
#### The Cerebrum: Temporal Lobe

Controls speech and hearing

**The Brainstem** Controls all automatic things, such as circulation

**The Spinal Cord** Links the brain to the rest of the body

**The Cerebellum** Controls balance, movement, and muscles



### Section B

#### The hypothalamus and pituitary gland

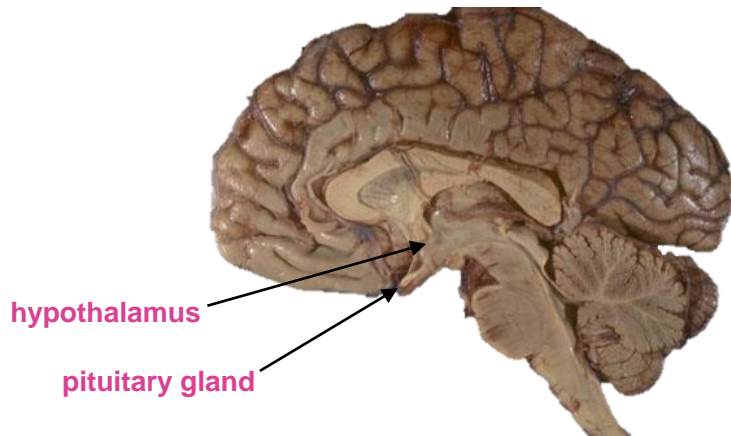
The hypothalamus is a region between the temporal lobe and the brainstem. Hormones and other biochemicals from the rest of the body can enter the brain via the blood which is important for the brain to stay connected to the body's messages. Many of these messages are integrated with electrical signals from the rest of the brain and put together in the hypothalamus. After putting together the messages, the hypothalamus responds, usually by telling the **pituitary gland** (you were introduced to this in Resource One) to produce and release more hormones.

# Resource Two

## Data Source

### Section B

Figure 4: Location of the hypothalamus and pituitary gland on a cross-section of a human brain



### Section C

#### What are neurons?



One of the main cell types in the brain is neurons. Like other animal cells, materials like oxygen and hormones can **diffuse** through their **cell membrane**. There are as many neurons in the brain as stars in the Milky Way! Neurons are **specialised** cells that can transmit chemicals and electrical impulses between each other and around the body to send and respond to the body's messages. Neurons are specialised because:

- They have long extensions, called **axons**, that contain a special type of cytoplasm, called **axoplasm**, that allows them to carry electrical and chemical messages over long distances in the brain.
- Axons are surrounded by a layer of cells called a **myelin sheath**, allowing electrical messages to be passed along quicker.
- Dendrites** are another type of extension that receives chemical and electrical messages from other neurons. Dendrites have thousands of smaller extensions called **dendritic spines**. This means that a single neuron can receive messages from many different cells, making **neuronal circuits** very complex!

# Resource Two

## Data Source

### Section C

Figure 5: What does a neuron look like?

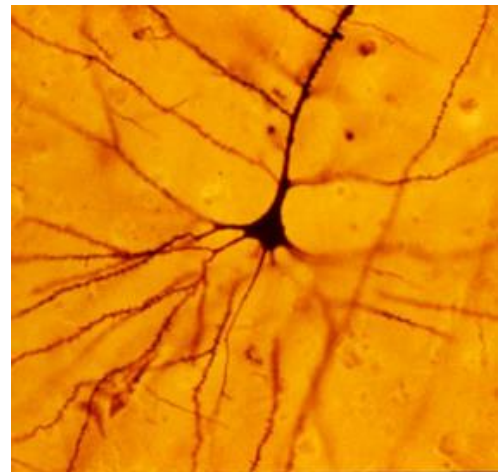


terminal branches



axon

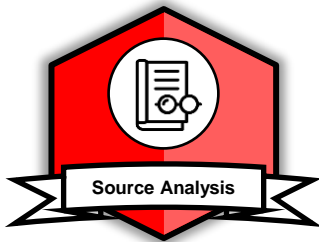
myelin sheath



mitochondria

dendrites/  
dendritic spines

cell body, surrounded  
by a cell membrane



Above is a diagram of a neuron with all the typical features vs a real neuron under the microscope that has been dyed black (without the dye, we would not be able to see it!).

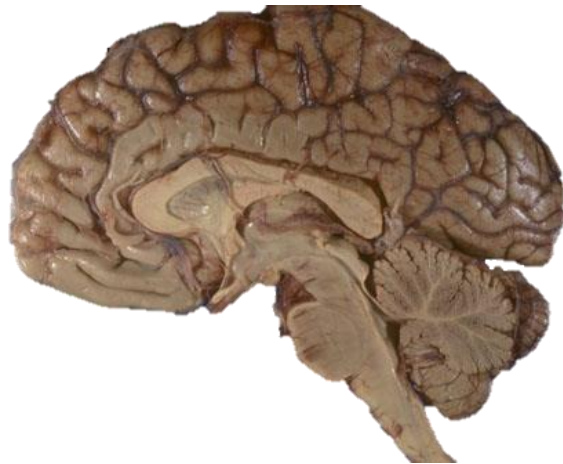
Can you identify some of the features of the real neuron?

# Resource **Two**

## Activities

### Activities

1. Describe how hormones and other biochemicals released from the endocrine glands in the body trigger responses from cells in the brain.
2. Using Figure 3 to help you, what part of the brain controls digestion?
3. When it comes to anatomy, cartoon diagrams can look very different from the 'real thing'. Can you draw a circle around the region you identified in response to Question 2?



4. In your own words describe the job of the hypothalamus.
5. Draw a diagram to show the main features of neurons and how you think two neurons would be connected as part of a circuit.

# Resource **Two**

## Further Reading

- Explore**
- <https://www.visiblebody.com/learn/endocrine/hormones>  
Look at the interactive map in section 3 to understand the location of the pituitary gland.
  - <https://www.youtube.com/watch?v=TVhm2rBGhB0>  
Take regular breaks during this video to allow you to process all of the information.
  - [https://www.youtube.com/watch?v=6qS83wD29PY&list=PLNZqyJnsvdMrr2Zfak7B89soUJo\\_jzqrH](https://www.youtube.com/watch?v=6qS83wD29PY&list=PLNZqyJnsvdMrr2Zfak7B89soUJo_jzqrH)  
Understanding neurons.
  - [https://www.youtube.com/watch?v=LQ4DIE1Xyd4&list=PLNZqyJnsvdMrr2Zfak7B89soUJo\\_jzqrH&index=8](https://www.youtube.com/watch?v=LQ4DIE1Xyd4&list=PLNZqyJnsvdMrr2Zfak7B89soUJo_jzqrH&index=8)  
Understanding the anatomy of the brain.
  - <https://kidshealth.org/en/teens/brain-nervous-system.html#catbody-basics>  
A written summary of the brain and nervous system.

- References**
- Ackerman, S (1992). 'Major Structures and Functions of the Brain' in Discovering the Brain National Academies Press (Washington, DC).  
<https://www.ncbi.nlm.nih.gov/books/NBK234157/>

- Image Sources**
- Figure 3: <https://www.twinkl.co.uk/teaching-wiki/brain-for-kids>
  - Figure 4: <https://webpath.med.utah.edu/HISTHTML/NEURANAT/CNS016A.html>
  - Figure 5: <https://www.vectorstock.com/royalty-free-vectors/woman-scientist-vectors>  
<https://creazilla.com/nodes/3163368-neuron-clipart>  
<https://neuroscientificallychallenged.com/posts/history-of-neuroscience-camillo-golgi>

# Resource **Three**

## Overview

**Topic** Sex hormones and brain development

**Key Stage 3 Subject Area** *Let's lay the foundations for your next phase of education!*  
**This topic links to KS4 biology:** Secondary sex characteristics.

**Objectives** **By completing this resource, you will be able to:**

- ✓ Read and compare data from graphs.
- ✓ Describe the fundamental hormonal changes occurring around birth, puberty, and adulthood.
- ✓ Understand how hormones can change the structure of the developing brain.

**Instructions**

1. Read the data source
2. Complete the activities
3. Explore the further reading
4. Move on to Resource Four



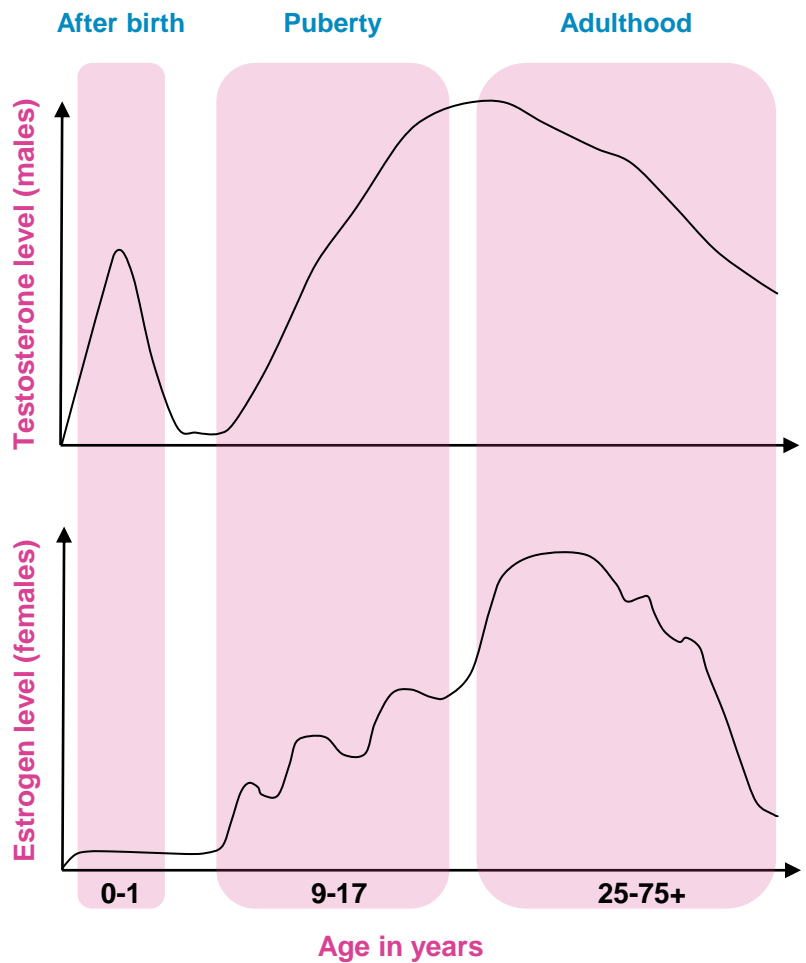
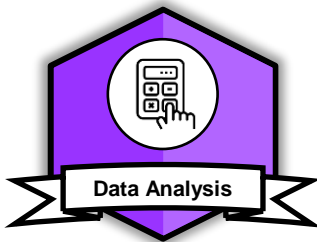
# Resource **Three**

## Data Source

**Section A**  
**Estrogen and testosterone**

Throughout our lives, the amounts of hormones in our bodies change. This is particularly true for our **sex hormones**: estrogen and **testosterone**. Estrogen is made mainly by the ovaries, and testosterone by the testes (Go back to Resource Once if you're struggling to remember!). The graphs below show how the levels of each hormone change with age in males and females.

**Figure 6: Changes in sex hormones with age**



# Resource **Three**

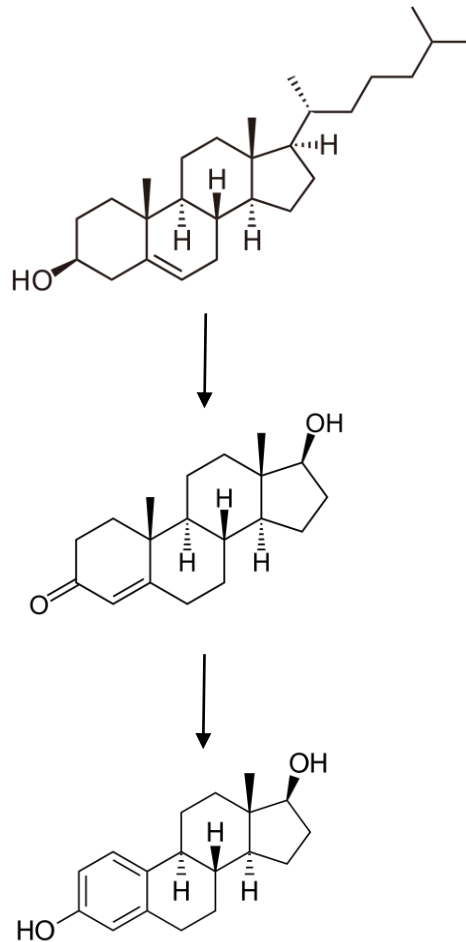
## Data Source

### Section A

Estrogen and testosterone are part of the same **synthetic pathway**, which starts with **cholesterol**. Therefore, it's important to remember that both males and females have both estrogen and testosterone in varying amounts! The biological reactions to make each biochemical product are controlled by **enzymes**. The enzyme that converts testosterone to estrogen is called aromatase.



**Figure 7: Sex hormone production**



### Cholesterol

- ~20% comes from your diet
- ~80% is made by your liver and intestines

### Testosterone

- Mostly made by the testes, but also made in the adrenal glands in both sexes
- Higher in males

### Estrogen

- Mostly made by the ovaries, but also made in the adrenal glands in both sexes
- Higher in females





# Resource Three

## Data Source

### Section B

#### Brain development with estrogen

Like every other hormone, sex hormones can enter the brain via the circulatory system. The male brain contains a lot of aromatase, so when testosterone enters the male brain, most of it is converted to estrogen. Estrogen is incredibly important in brain development, helping to shape the structure of our brains and fine-tune the connections to prepare us for adulthood so that we can think, feel, and behave maturely. The developmental period is also known as the *organisational period*.

The organisational period is typically defined as the period straight after birth. The main effects of estrogen on the brain during the organisational period are:

- New cell growth (neurogenesis, “new-ro-jen-ess-iss”)
- Increasing dendritic spines (spinogenesis, “spine-oh-jen-ess-iss”)
- Forming more connections between neurons (synaptogenesis, “sigh-nap-toe-jen-ess-iss”)
- Cell death (apoptosis, “a-pop-toe-siss”)
- Removal of connections between cells (pruning)

The effects of estrogen are different between the sexes, i.e., sexually dimorphic. These effects help wire the brain to make it more ‘male’ or more ‘female’, changing how we think about problems and how we approach our relationships. The effects are also dependent on the time of exposure and brain region. For example, estrogen in the male hypothalamus just after birth increases apoptosis, but estrogen in the female hypothalamus during puberty increases neurogenesis.

After the brain has finished developing, estrogen and testosterone continue to act on the brain, *activating* the brain circuitry they built during development.



# Resource **Three**

## Activities

### Activities



1. Make a comic book strip to show how hormones can alter brain structure.
2. Does estrogen act on the brain in an autocrine, paracrine, or endocrine manner?
3. Would you say that the female brain develops in the absence or the presence of estrogen? Explain your answer.
4. Using further reading, what other effects do estrogen and testosterone have on the body?

# Resource **Three**

## Further Reading

- Explore**
- <https://kids.frontiersin.org/articles/10.3389/frym.2020.00053>  
This article summarises this resource and will give you a head start on the next one!
  - <https://www.youtube.com/watch?v=dISmdb5zfiQ>  
A short video on pruning and what it does for our brains.
  - <https://www.youtube.com/watch?v=0O1u5OEc5eY>  
A short video about why the teenage brain is so amazing!

- References**
- Dovey, J. L. and N. Vasudevan (2020). 'Does GPER1 Play a Role in Sexual Dimorphism?' *Front Endocrinol (Lausanne)*, 11: 595895.  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7661790/>
  - Villa, E. et al (2012). 'Reproductive Status Is Associated with the Severity of Fibrosis in Women with Hepatitis C.' *PLoS One*, 79: 9.  
[https://www.researchgate.net/publication/236142974\\_Reproductive\\_Status\\_Is\\_Associated\\_with\\_the\\_Severity\\_of\\_Fibrosis\\_in\\_Women\\_with\\_Hepatitis\\_C](https://www.researchgate.net/publication/236142974_Reproductive_Status_Is_Associated_with_the_Severity_of_Fibrosis_in_Women_with_Hepatitis_C)

- Image Sources**
- Figure 7: <https://en.wikipedia.org/wiki/Cholesterol>  
<https://en.wikipedia.org/wiki/Testosterone>  
<https://en.wikipedia.org/wiki/Estrogen>

# Resource **Four**

## Overview

**Topic** Your brain during puberty

**Key Stage 3 Subject Area** *Let's lay the foundations for your next phase of education!*  
**This topic links to KS4 psychology:** How the structure and function of the brain relate to behaviour.

**Objectives** **By completing this resource, you will be able to:**

- ✓ Interpret data from graphs.
- ✓ Understand how pubertal hormones affect behaviour.
- ✓ Challenge and question findings from scientific studies.

**Instructions**

1. Read the data source
2. Complete the activities
3. Explore the further reading
4. Move on to the final reflection activity



# Resource **Four**

## Data Source

### Section A

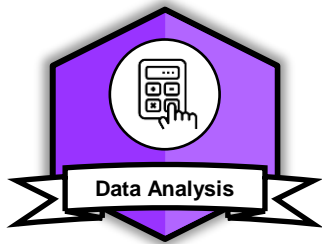
### Emotional learning

Puberty is a complex transition period that prepares us for adulthood. As children, we learn language, how to walk, and how to feed ourselves. Most of our learning (outside schoolwork) during puberty is social and emotional learning. An example of this is **mixed emotion understanding**.

Mixed emotion understanding is the ability to understand that a single event can lead to a mixture of (usually opposite) emotions rather than just one. For example, happiness and sadness. One study showed children between 5 and 12 years old a scene from Disney's *The Little Mermaid*, in which the main character, Ariel, says goodbye to her mermaid father, King Triton, so that she can continue her life as a human woman. Children were asked:

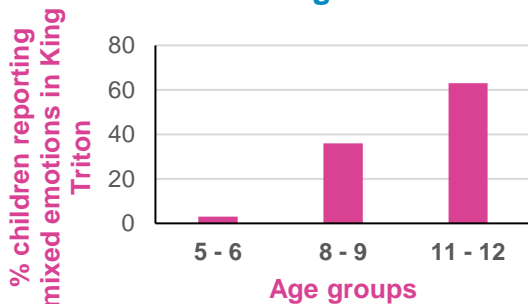
- How they thought King Triton felt?
- How they felt watching the scene?

Older children were more likely than younger children to report mixed emotions in themselves and King Triton. Scientists believe this has something to do with the hormonal changes associated with the beginning of puberty.

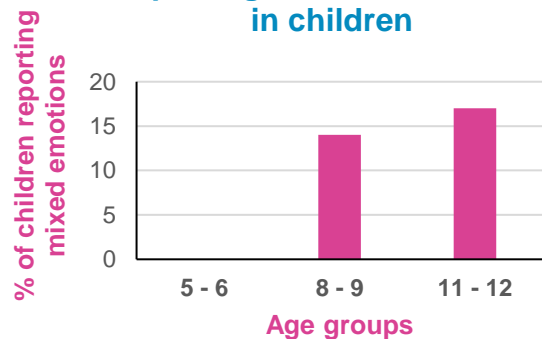


**Figure 8: Percentage children of different ages reporting mixed emotions in themselves and King Triton in the final scene of *The Little Mermaid***

**Reporting of mixed emotions in King Triton**



**Reporting of mixed emotions in children**



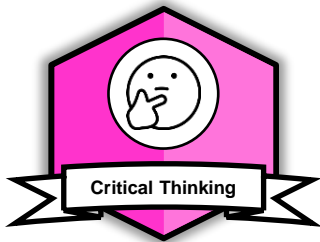
# Resource **Four**

## Data Source

### Section B

#### Risk taking

Risk-taking is a social behaviour that comes in two forms: positive and negative. Positive risk-taking has the potential for benefit or harm. For example, asking your crush out on a date: they may say yes or no. Negative risk-taking has minimal benefit and is usually harmful. For instance, trying illegal drugs. It might be fun in the short term, but there is a high chance of becoming addicted.



Risk-taking is part of growing up as it helps us to develop our independence and identity. We are more likely to take risks if there is a reward, making risk-taking a **motivated behaviour**. Our motivation is regulated by a brain chemical called **dopamine**. Interestingly, estrogen promotes dopamine release, making us more motivated to take risks and seek rewards.

One study used a slot machine game to assess risk-taking in pubertal girls aged between 11-13, and their saliva was used to measure how much testosterone and estrogen they had in their bodies. This was measured with an MRI scanner. The study found that:

- Girls with higher estrogen and testosterone were more likely to take riskier bets on the slot machine game.
- Girls with higher estrogen and testosterone showed more activation in brain regions rich in dopamine.



**Figure 9: An MRI scanner, used to measure brain activity**



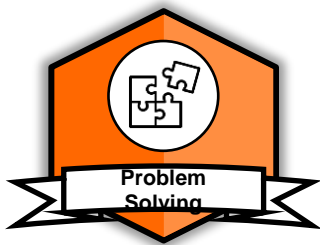
# Resource **Four**

## Activities

### Activities



1. Can you think of any risks you've taken as a teenager that you may not have taken as a child? Do you think those risks are associated with puberty?
2. Use the prompts to write a short conclusion to summarise the key points from the data in Figure 8:
  - Older children are more likely to...
  - Older children have a better understanding of...
  - Differences between age groups are probably related to...
3. Looking back at Figure 8, the percentage of 11–12-year-olds reporting mixed emotions in King Triton was 63%, while the percentage of 11–12-year-olds reporting mixed emotions was just 17%. Why do you think this is?
4. In these examples of risk-taking behaviours, identify the reward and the risk, then state whether you think this is positive risk-taking or negative risk-taking and why:



- Taking part in a dangerous sport, like rock climbing, using safety equipment.
  - Driving under the influence of alcohol.
  - Riding a rollercoaster.
  - Asking your teacher for help with your schoolwork.
  - Cheating in a test.
5. Page 29 gives details about a study on risk-taking in girls. Draw two-line graphs to show that girls with higher estrogen and testosterone were more likely to take riskier bets on the slot machine game. (Do not worry too much about exact numbers; the relative positions of the lines matter!).

# Resource **Four**

## Further Reading

- Explore**
- <https://www.oxfordsparks.ox.ac.uk/podcasts/what-makes-the-human-brain-so-special/>  
A podcast with Dr Rogier Mars, a neuroscientist at the University of Oxford. He uses MRI scanners to better understand the brain.
  - <https://www.youtube.com/watch?v=evzGkXKgCzQ>  
More information on dopamine.
  - <https://www.verywellmind.com/depression-during-puberty-1067561#:~:text=Estrogen%2C%20a%20female%20sex%20hormone,in%20depression%20rates%20among%20them>  
Another effect of puberty is depression. This is seen mostly in girls due to the effects of estrogen. Read about it in this article.

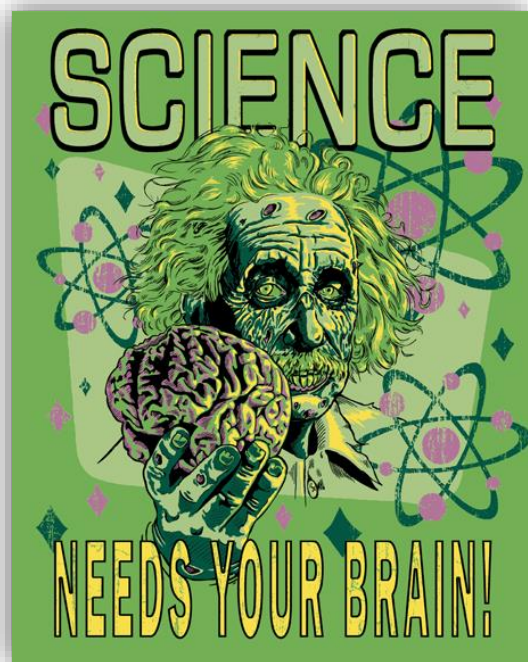
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  - de Macks, Z. A. O. et al (2016). 'Risky decision-making in adolescent girls: The role of pubertal hormones and reward circuitry.' Psychoneuroendocrinology, 74. <https://www.sciencedirect.com/science/article/pii/S0306453016305741?via%3Dihub>

- Image Sources**
- Figure 9: <https://www.gettyimages.co.uk/photos/ct-scan>



# Final Reflection Activity

## Further Guidance



Now it's time for you to be a scientist! We've covered a lot in this coursebook, but we are constantly learning as scientists. Use these activities to stretch yourself, grow your understanding, and maybe even develop your interest in scientific research!

### Individual activity

As a class, pick a scene from a movie, book, or song that makes you feel emotional. Speak to other people about how that movie/ book/ song makes them feel (if they're not familiar, show it to them or do your best to describe it!). Collect data based on their answers, thinking about:

- How many **different** emotions do they describe? (Words describing a similar emotion, such as 'sad' and 'depressed', are not considered different).
- Are their emotions different according to their age and sex? (Make sure you ask a range of people of different ages).

Once you have collected your data, display it in a graph. What has the data told you? Please write a short conclusion or discuss it with your peers.

### Group activity

Posters are a very important tool in science communication. Only some people have time to read a long paper, so putting the key facts into an easy-to-understand poster is useful.

Using this coursebook and the extra reading material, produce a poster to show off why you think your teenage brains are amazing. Think about how hormones affect your brains to make them change and develop and what that means for your learning and personality. Ensure you include diagrams and other visuals, so it's not just full of text! Make it fun and colourful, and – most importantly – make sure it stays true to the science!

# Reference List

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<https://www.ncbi.nlm.nih.gov/books/NBK234157/>

- Image Sources**
- Figure 2: [https://en.wikipedia.org/wiki/Endocrine\\_system](https://en.wikipedia.org/wiki/Endocrine_system)
  - Activity 4: <https://www.free-anatomy-quiz.com/endocrineQs1.html>
  - Figure 3: <https://www.twinkl.co.uk/teaching-wiki/brain-for-kids>
  - Figure 4: <https://webpath.med.utah.edu/HISTHTML/NEURANAT/CNS016A.html>
  - Figure 5: <https://www.vectorstock.com/royalty-free-vectors/woman-scientist-vectors>  
<https://creazilla.com/nodes/3163368-neuron-clipart>  
<https://neuroscientificallychallenged.com/posts/history-of-neuroscience-camillo-golgi>
  - Figure 6 adapted from  
[https://www.researchgate.net/publication/237611411\\_A\\_The\\_ory\\_Explaining\\_Biological\\_Correlates\\_of\\_Criminality/figures?lo=1](https://www.researchgate.net/publication/237611411_A_The_ory_Explaining_Biological_Correlates_of_Criminality/figures?lo=1) and  
[https://www.researchgate.net/publication/236142974\\_Reproductive\\_Status\\_Is\\_Associated\\_with\\_the\\_Severity\\_of\\_Fibrosis\\_in\\_Women\\_with\\_Hepatitis\\_C](https://www.researchgate.net/publication/236142974_Reproductive_Status_Is_Associated_with_the_Severity_of_Fibrosis_in_Women_with_Hepatitis_C)
  - Figure 7: <https://en.wikipedia.org/wiki/Cholesterol>  
<https://en.wikipedia.org/wiki/Testosterone>  
<https://en.wikipedia.org/wiki/Estrogen>
  - Figure 9: <https://www.gettyimages.co.uk/photos/ct-scan>



# Reference List

## Image Sources

- Final Reflection Activity:  
<https://www.rowsdowr.com/2012/11/04/zombie-celebrities-and-historical-figures-by-shawn-conn/science-copy/>



# More Subject Resources

## A Deeper Look into Behavioural Neuroendocrinology



- Read**
- <https://www.eara.eu/post/feature-why-do-we-need-to-use-animals-in-neuroscience-research#:~:text=Which%20animals%20are%20used%20in,good%20overview%20of%20brain%20processes.>  
A lot of our understanding of the brain comes from using animal models.
  - <https://kids.frontiersin.org/articles/10.3389/frym.2020.554380>  
This article summarises everything you've looked at in this coursebook.
- Watch**
- [https://www.youtube.com/watch?list=PL003npd2UuCCgYjhhGVUIRAwhqWpQucTj&time\\_continue=336&v=FnfVfH6jNmA&feature=emb\\_logo](https://www.youtube.com/watch?list=PL003npd2UuCCgYjhhGVUIRAwhqWpQucTj&time_continue=336&v=FnfVfH6jNmA&feature=emb_logo)  
The effect of hormones on the brain and behaviour is much more complex than we could fit in this coursebook! This video starts to unpick how hormones set our brains up for behaviour in adulthood.
- Listen**
- <https://open.spotify.com/show/5gSocw3CVfhUpYEfslIjxa?si=e278eb67f1524870>  
A podcast on neuroscience and behaviour.
- Do**
- Follow scientists on Instagram to get a look behind the scenes! @hormonesmademedoit @thepathphd @notbrainscience @phdwithlucy @adhd\_understood @abioblog

# Study Skills, tips & Guidance

This section includes helpful tips to help you complete this pack and improve your study skills for school.

It also includes a few fantastic, easy-to-use resources to know what to do next and where else you can look for more information on the subject.



## Helpful information you will find in this section:

1. Cornell Notes
2. Academic Terminology (keywords)
3. Academic Writing Style
4. Referencing
5. How to Evaluate Your Sources
6. Subject Guidance
7. University Guidance

**Psst! Learning these tips to improve your school skills could help you do better in exams and make assignments easier!**

**You can use the tips and web links in this section throughout your pack!**



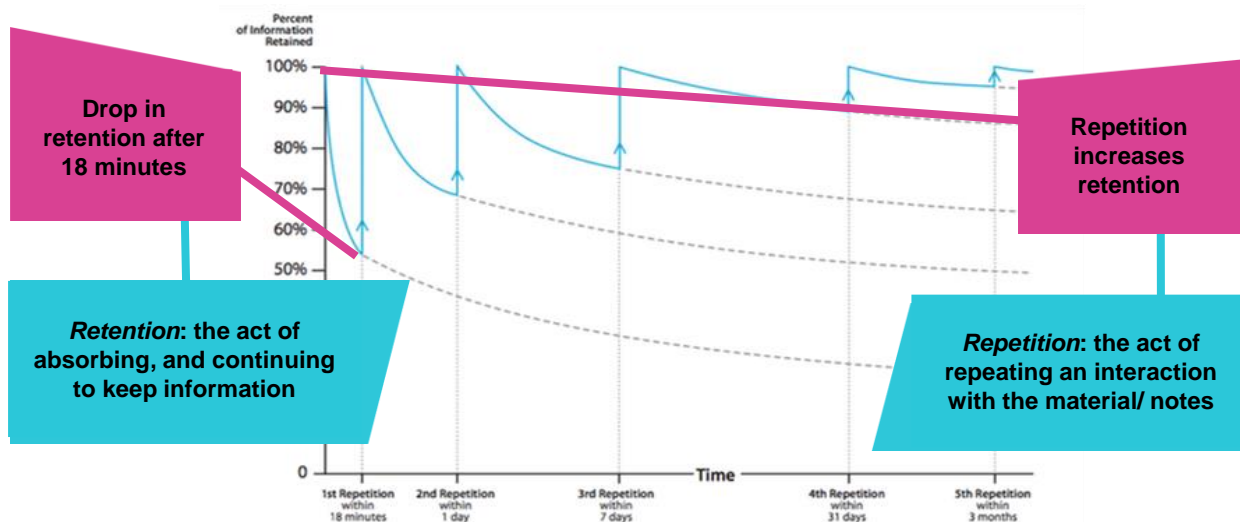
# Academic Study Skills

## Cornell Notes

### Why is good note-taking important?

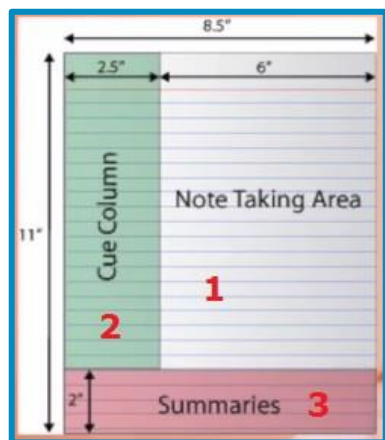
If you forget new information almost as quickly as you hear it, even if you write it down, you tend to lose nearly 40% of new information within 24 hours of first reading or hearing it.

However, if we take notes effectively, we can retain and retrieve almost 100% of the information we receive. Consider this graph on the rate of forgetting with study/ repetition:



### Learning a new system

The Cornell Note System was developed in the 1950s at the University of Cornell in the USA. The system includes interacting with your notes and is suitable for all subjects. There are three steps to the Cornell Note System.



### Step 1: Note-Taking

- 1. Create Format:** Notes are set up in the Cornell Way. This means creating three boxes like the ones on the left. You should put your name, date, and topic at the top of the page.
- 2. Write and Organise:** You then take your notes in the 'note taking' area on the right side of the page. It would be best if you organised these notes by keeping a line or a space between 'chunks'/ main ideas of information. You can also use bullet points for lists of information to help organise your notes.

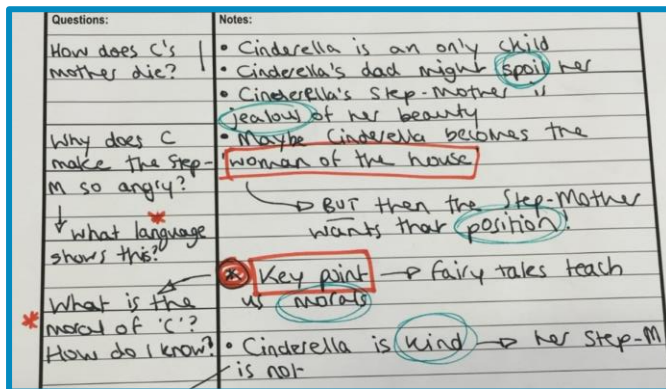
# Academic Study Skills

## Cornell Notes

### Step 2: Note-Making

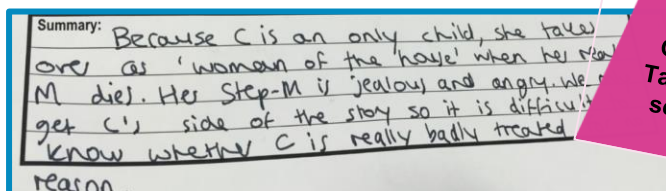
- Revise and Edit Notes:** Go back to box 1, the note-taking area and spend some time revising and editing. You can do this by highlighting 'chunks' of information with a number or a colour; circling all keywords in a different colour; highlighting main ideas; adding new information in another colour.
- Note Key Idea:** Go to box two on the left-hand side of the page and develop some questions about the main ideas in your notes. The questions should be 'high level'. This means they should encourage you to think deeper about the ideas. Example 'high level' questions would be:
  - Which is the most important/ significant reason for...
  - To what extent...
  - How does the (data/ text/ ideas) support the viewpoint?
  - How do we know that...

Here is an example of steps 1 and 2 for notes on the story of Cinderella



### Step 3: Note-Interacting

- Summary:** Go to box three at the bottom of the page, summarise the main ideas in box one, and answer the essential questions in box 2.



Give the Cornell Note-Taking System a try and see if it works for you!



# Academic Study Skills

## Key Words

Below is a series of key terms you will come across from teachers and tutors as you go through school, especially as you enter upper secondary.

Knowing these will help you understand what you are being asked to do!

- **Analyse:** When you analyse something, consider it carefully and in detail to understand and explain it. To analyse, identify the main parts or ideas of a subject and examine or interpret the connections between them.
- **Comment on:** When you comment on a subject or the ideas in a subject, you say something that gives your opinion or an explanation.
- **Compare:** To compare things means to point out their differences or similarities. A comparison essay would involve examining the qualities/ characteristics of a subject and emphasising the similarities and differences.
- **Contrast:** When you contrast two subjects, you show how they differ when compared with each other. A contrast essay should emphasise striking differences between two elements.
- **Compare and contrast:** To write a compare and contrast essay, you would examine the similarities and differences between two subjects.
- **Criticise:** When you criticise, you make judgments about a subject after thinking about it carefully and deeply. Express your judgement concerning the correctness or merit of the factors under consideration. Give the results of your analysis and discuss the limitations and contributions of the factors in question. Support your judgement with evidence.
- **Define:** When you define something, you show, describe, or state clearly what it is and what it is like; you can also say its limits. Do not include details but do include what distinguishes it from the other related things, sometimes by giving examples.
- **Describe:** To describe in an essay requires you to give a detailed account of a subject's characteristics, properties or qualities.
- **Discuss:** To discuss in an essay, consider your subject from different points of view. Examine, analyse and present considerations for and against the problem or statement.

# Academic Study Skills

## Key Words

- **Evaluate:** When you evaluate in an essay, decide on your subject’s significance, value, or quality after carefully studying its good and bad features. Similar to assess. Use authoritative (e.g. from established authors or theorists in the field) and, to some extent, personal appraisal of both contributions and limitations of the subject.
- **Illustrate:** If asked to illustrate in an essay, explain the points that you are making clearly by using examples, diagrams, statistics, etc.
- **Interpret:** In an essay that requires you to interpret, you should translate, solve, give examples, or comment upon the subject and evaluate it in terms of your judgement or reaction. Explain what your subject means. Similar to explain.
- **Justify:** When asked to justify a statement in an essay, you should provide the reasons and grounds for the conclusions you draw from the statement. Present your evidence in a form that will convince your reader.
- **Outline:** Outlining requires that you explain ideas, plans, or theories in a general way, without giving all the details. Organise and systematically describe the main points or general principles. Use essential supplementary material, but omit minor details.
- **Prove:** When proving a statement, experiment or theory in an essay, you must confirm or verify it. You must evaluate the material and present experimental evidence and/ or logical argument.
- **Relate:** To relate two things, you should state or claim the connection or link between them. Show the relationship by emphasising these connections and associations.
- **Review:** When you review, critically examine, analyse and comment on the major points of a subject in an organised manner.

Write any other keywords you come across below. Ask your teacher to explain their meaning or use a dictionary to find out.

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# Academic Study Skills

## Academic Writing Style

### What is academic writing?

'Academic writing' is a specific way of writing when communicating research or discussing a point of view. You will most often do this in essays and reports.

Academic writing has a logical structure and uses formal language. Unlike creative or narrative writing, academic writing uses different sources of information to support what is being said (see next page about various sources).

### Top Academic Writing Tips

#### Do's

- Do use words you know the meaning of and are confident using.
- Remember, words don't have to be complicated to be clear!
- Do write words out fully, e.g., do not, cannot, does not, it would.
- Use the third person point of view
- Minimise the use of informal adjectives, such as cool, amazing and wonderful.

#### Don'ts

- Do not use contractions, e.g., don't, can't, doesn't, it'd.
- Do not use public speaking phrases like "We can all agree that..." and "As I previously mentioned...".
- Do not use conversational phrases, such as 'literally' or 'basically' too often.
- Do not use slang or jargon, for example, 'awks', 'lit', 'woke'.
- Do not use words that express value judgements, e.g., crazy, ridiculous, terrible. Suitable synonyms are surprising, unjustified or distressing.



# Academic Study Skills

## Academic Writing Style

### Expressing your opinion in academic writing

In academic writing, it is best practice to express an opinion without writing in the first person.

Rather than saying, ‘In my opinion, this proves that you can express your opinion by saying:

- ‘Based on (insert fact/ theory/ finding) it shows that....’;
- ‘The graph here indicates that...’;
- ‘The aforementioned problems in Smith’s argument reveal that...’;
- ‘Such weaknesses ultimately mean that...’; and so on.

### Signposting

Signposting guides your reader through different sections of your writing. It lets those who read your writing know what is being discussed and why and when your piece is shifting from one part to another. This is crucial for clear communication with your audience.

Signposting stems for a paragraph which expands upon a previous idea	Signposting stems for a paragraph which offers a contrasting view
Building on from the idea that ... (mention the previous idea), this section illustrates that ... (introduce your new idea).	However, another angle on this debate suggests that ... (introduce your contrasting idea)
To further understand the role of ...(your topic or your previous idea), this section explores the idea that ... (introduce your new idea)	In contrast to evidence which presents the view that ... (mention your previous idea), an alternative perspective illustrates that ...
Another line of thought on ... (your topic or your previous idea) demonstrates that ...	However, not all research shows that ... (mention your previous idea). Some evidence agrees that ...

# Academic Study Skills

## Referencing

### What is a reference or referencing?

A reference is just a note in your assignment that tells your reader where particular ideas, information or opinions that you have used from another source have come from. It can be done through 'citations' or a 'bibliography'.

You must include references in your writing assignments when you get to university. As well as being academic good practice, referencing is very important because it will help you to avoid plagiarism.

Plagiarism is when you take someone else's work or ideas and pass them off as your own. Whether plagiarism is deliberate or accidental, the consequences can be severe. You must be careful to reference your sources correctly.

### Why should I reference?

#### Referencing is essential in your work for the following reasons:

- It gives credit to the authors of any sources you have referred to or been influenced by.
- It supports the arguments you make in your assignments.
- It demonstrates the variety of sources you have used.
- It helps prevent you from losing marks or failing due to plagiarism.

#### When should I use a reference?

- You should use a reference when you:
  - Quote directly from another source.
  - Summarise or rephrase another piece of work.
  - Include a specific statistic or fact from a source.



# Academic Study Skills

## Referencing

### How do I reference?

There are several different ways of referencing, but most universities use the Harvard Referencing Style. Please speak with your teacher about which style they want you to use because the most important thing is that you remain consistent!

The two main aspects of referencing you need to be aware of are:

#### 1. In-text citations

These are used when directly quoting a source. They are in the body of the work after you have referred to your source in your writing. They contain the surname of the source's author and the year it was published in brackets.

- E.g. *Daisy describes her hopes for her infant daughter, stating, "I hope she'll be a fool—that's the best thing a girl can be in this world, a beautiful little fool."* (Fitzgerald, 2004).

#### 2. Bibliography

This is a list of all the sources you have referenced in your assignment. In the bibliography, you list your references by the numbers you have used and include as much information as possible about the reference. The list below gives what should be included for different sources.

- **Websites:** Author (if possible), *title of the web page*, 'Available at:' website address, [Accessed: date you accessed it].
  - E.g. 'How did so many soldiers survive the trenches?', Available at: <http://www.bbc.co.uk/guides/z3kgjxs#zg2dtfr> [Accessed: 11 July 2019].
- **Books:** Author surname, author first initial, (year published), *title of book*, publisher
  - E.g. Dubner S. and Levitt, S., (2007) *Freakonomics: A Rogue Economist Explores the Hidden Side of Everything*, Penguin Books
- **Articles:** Author, '*title of the article*', where the article comes from (newspaper, journal, etc.), date of the article.
  - E.g. Maev Kennedy, 'The lights to go out across the UK to mark First World War's centenary', The Guardian Newspaper, 10 July 2014.

# Academic Study Skills

## Referencing

Is it a source worth citing? Use these tips to question your sources before referencing them.

- **Currency – the timelines of the information:** When was it published or posted? Has it been revised or updated? Does your topic require current information, or will older sources also work?
- **Relevancy – the importance of the information for your needs:** Does the information relate to your topic or answer your question? Have you looked at a variety of sources? Who is the intended audience?
- **Authority - the source of the information:** Who is the author/ publisher/ source/ sponsor? What are the author's credentials? Is the author qualified to write on the topic?
- **Accuracy – the reliability and correctness of the source:** Does evidence support the information? Has the information been reviewed or refereed? Can you verify whether it is a personal or professional source? Are there errors?
- **Purpose – the reason the information exists:** Does the author clarify the intentions/ purpose? Is the information fact opinion or propaganda? Are there biases? Does the viewpoint appear objective?



# Academic Study Skills

## Evaluating Your Sources

### What is a source?

When you learn new things, you might get information from different places. These places are called sources. Some sources are more reliable than others. For example, information in a textbook written by an expert is more reliable than the information in a non-expert's social media post.

How do you decide which source to use? From newspaper articles to books to tweets, this provides a brief description of each source type and breaks down the factors to consider when selecting a source.

#### Twitter



A platform for millions of concise messages on a variety of topics.

#### Blog



Blogs (e.g. WordPress) are an avenue for sharing both developed and unpublished ideas and interests with a niche community.

#### Youtube



A collection of millions of educational, inspirational, eye-opening and entertaining videos.

#### Newspaper



A reporting and recording of cultural and political happenings that keeps the general public informed. Opinions and public commentaries can also be included.

#### Journal



A collection of analytics reports that outline the objectives, background, methods, results and limitations of new research written for and by scholars in a niche field.

#### Academic book



The information presented is supported by clearly identified sources. Sometimes each chapter has a different author.

#### Encyclopaedia



Books or online – giving information on many different subjects. Some are intended as an entry point into research; some provide detailed information and onwards references.

#### Popular magazine



A glossy compilation of stories with unique themes intended for specific interests.

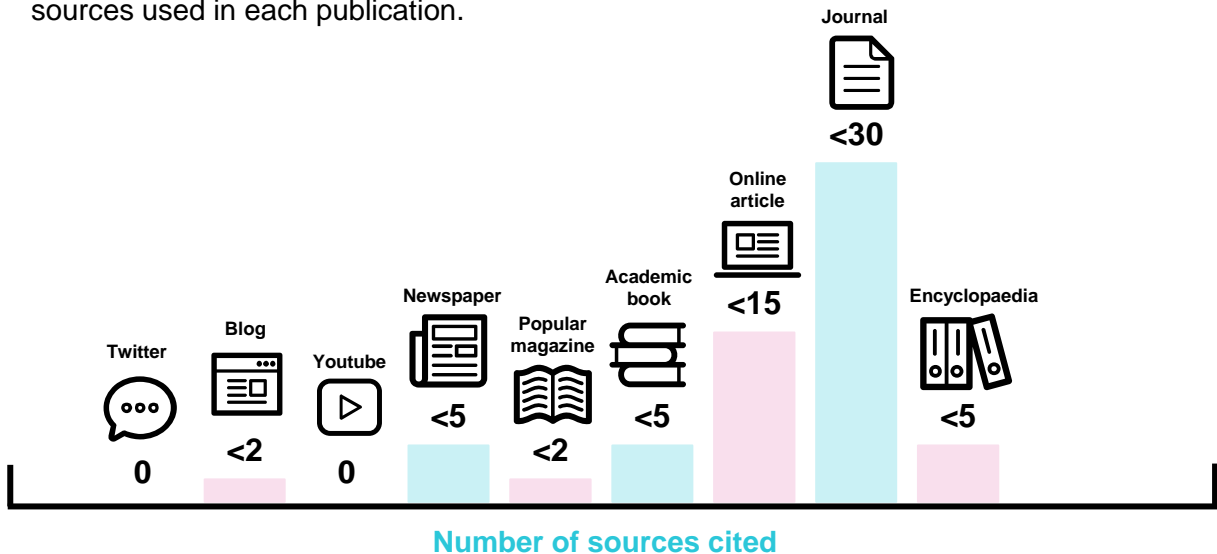


# Academic Study Skills

## Evaluating Your Sources

### Number of outside sources

When an author used many outside sources in their writing, they demonstrate familiarity with ideas beyond their own. As more unique viewpoints are pulled into a source, it becomes more comprehensive and reliable. This shows the typical number of outside sources used in each publication.



### Degree of review before a source is published

Two factors contribute to the amount of inspection a source receives before it might be published: the number of reviewers fact-checking the written ideas and the total time spent by reviewers as they fact-check. The more people involved in the review process and the longer the review process takes, the more credible the source is likely to be.

#### Number of reviewers



Time in review

#### 0 reviewers



seconds



minutes



minutes

#### 1-2 reviewers



hours



days



days

#### 3-4 reviewers



2-3 months



6-2 months

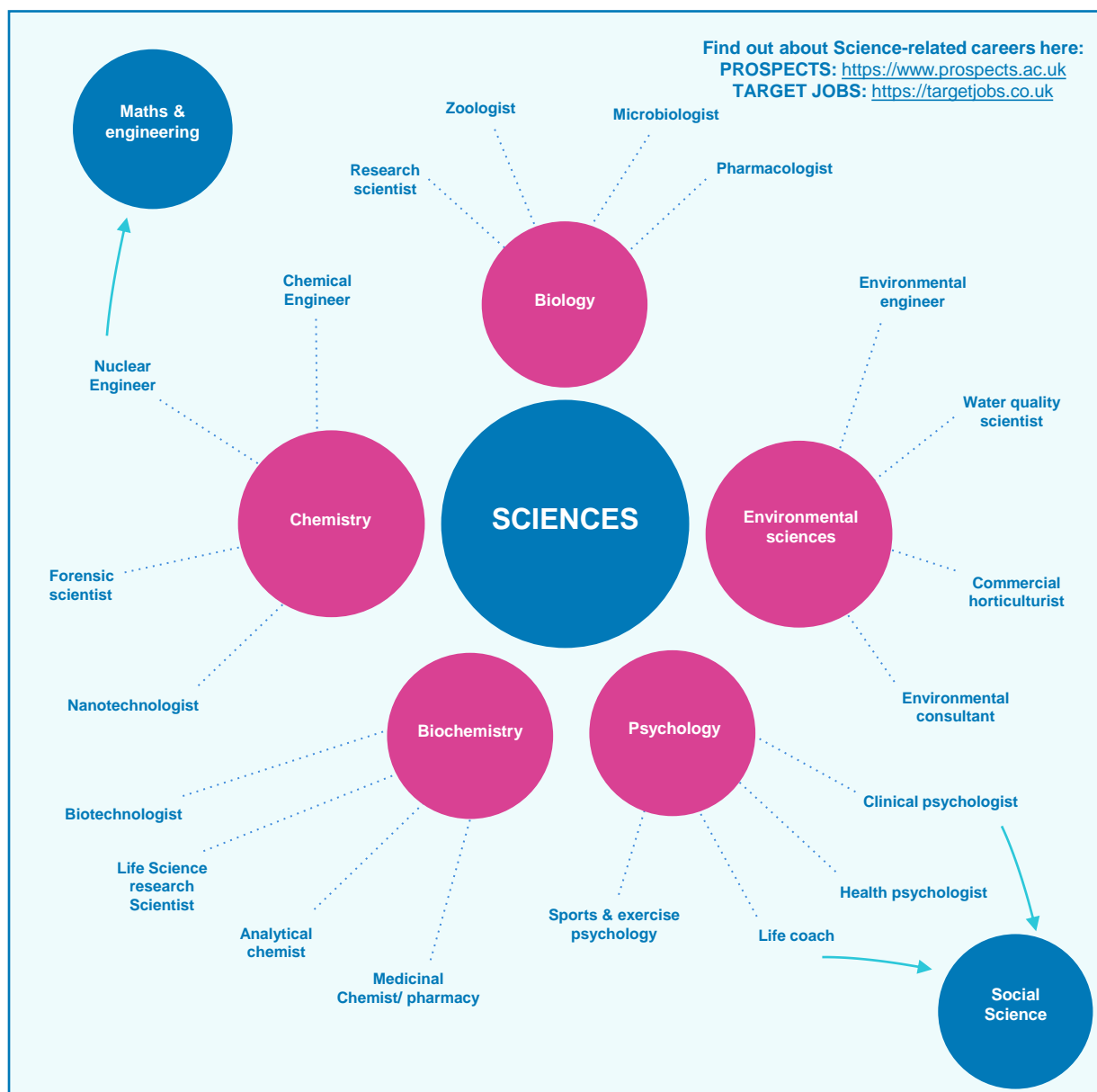


3-5 years

# What's next?

## Sciences subject maps & jobs

A degree in Sciences gives Students access to many career choices. Students who study sciences go on to pursue their Master's degree in Science. However, a significant portion of them also start looking for jobs in the fields of Cancer Research, Stem Cell technology and other positions in this space.



# What's next?

## University Guidance

**Different people go to university for different reasons. You might have a particular job in mind or want to study a subject you are passionate about.**

**Whatever your motivations, going to university can help improve your career prospects and develop your confidence, independence and academic skills.**

### Choosing a course and university

Choosing the right course to study is important, so research the options available to you. Here are some top tips:

- You don't have to choose a course you have already studied; many courses don't require prior knowledge of the subject. You can apply skills gained from school studies to a new field.
- The same subject can be taught differently depending on your chosen course and university. Search university websites to learn more about the course content, teaching styles and assessment types.
- When choosing a university, think about what other factors are important to you. Do you want to study at a campus university or be based in a city center? What accommodation options are there? Does the university have facilities for any extracurricular activities you're involved in?
- To research your options, look at university prospectuses and websites and see if there are opportunities to speak to current students who can give you a real insight into what life is like there.



# What's next?

## University Guidance

### Exploring careers and subject options

- Find job descriptions, salaries and hours, routes into different careers, and more at <https://www.startprofile.com/>
- Research career and study choices, and see videos of those who have pursued various routes at <http://www.careerpilot.org.uk/>
- See videos about what it's like to work in different jobs and for different organisations at <https://www.careersbox.co.uk/>
- Find out what different degrees could lead to, how to choose the right course for you, and how to apply for courses and student finance at <https://www.prospects.ac.uk/>
- Explore job descriptions and career options, and contact careers advisers at <https://nationalcareersservice.direct.gov.uk/>
- Discover which subjects and qualifications (not just A levels) lead to different degrees and what careers these degrees can lead to at <http://www.russellgroup.ac.uk/media/5457/informed-choices-2016.pdf>

### Other useful resources

- <https://www.ucas.com/>
- <https://www.whatuni.com/>
- <https://www.opendays.com/>
- <https://www.thecompleteuniversityguide.co.uk/>



You may or may not have thought about studying at university.

Don't worry – you have plenty of time to think about this and explore your options if you would like to go!

# What's next?

## University Guidance

### UCAS and the university application process

All applications for UK degree programmes are made through **UCAS**. There is lots of information on the UCAS website to guide you through the process and what you need to do at each stage.

#### Apply

- Applications **open in September** the year before you plan to start university.
- You can apply for up to **five courses**.
- The deadline for most courses is **25 January**.
- The University of Reading's UCAS code is **R12**. It does not have a UCAS campus code.

#### Decisions

- Some courses may require an interview, portfolio or admissions test in addition to a UCAS application. Check individual university website details.
- Check UCAS Track which will be updated with decisions from the universities you have applied for, and to see your deadline for replying to any offers.
- You should choose a firm (or first) choice university and an insurance choice. If you already have your exam results or a university thinks your application is particularly strong, you might receive an **unconditional offer**.

#### Results

- If you're holding a conditional offer, then you will need to wait until you receive your exam results to have your place confirmed.
- Clearing & Adjustment allows you to apply to courses which still have vacancies if you didn't meet the conditions of your offer, have changed your mind about what or where you want to study, or have met and exceeded the conditions of your offer and would like to look at alternate options.

### Personal statements

An important part of your application is the personal statement. The personal statement allows you to tell universities why they should offer you a place.

Here are a few top tips for making your personal statement stand out:

- You can only submit one personal statement, so it's important that you are consistent in your course choices. Make sure you have done your research to show your understanding of the subject area and your passion for it.

# What's next?

## University Guidance

### Personal Statement (cont.)

- Start by brainstorming all your skills, experience and attributes. Once you have everything written down, you can begin to be selective – you only have 47 lines so won't be able to include everything.
- The ABC method: action, benefit and course can be a useful way to help demonstrate your relevant experience and how it applies to the course you're applying for.

### Personal Statement do's and don'ts

Read the tips below from real life professors and admissions staff in university Science departments, on the 'do's' and 'don'ts' of what to include in your personal statement.

#### Science

- Tell us why you want to study Science.
- What area of Science fascinates you?
- Demonstrate your interest by telling us what you have recently read, watched or listened to and how they helped your understanding of Science.
- Describe how your school or individual work has equipped you with the necessary knowledge and ability to be a successful Science student.

### Other useful resources

- An easy template to start practising your personal statement:  
<https://www.ucas.com/sites/default/files/ucas-personal-statement-worksheet.pdf>
- Untangle UCAS terminology at <https://www.ucas.com/corporate/about-us/who-we-are/ucas-terms-explained>
- Discover more about the application process including when to apply and how to fill in your application on the [UCAS website](#).
- Read more useful advice about what to include in your personal statement on [UCAS, the Complete University Guide](#) and [The UniGuide](#).
- Attend one of the University of Reading's [virtual sessions](#) to find out more about applying and personal statements.

# Insight into the University of Reading

## University of Reading



University of  
Reading

The author of this coursebook attends the University of Reading.

The University of Reading offers a variety of programmes for Key Stage 3 pupils.  
For more information about the below programmes [click here](#).

### Widening Participation for Under 16s

**Find Your Future:** Our Find Your Future days are on campus events that feature a diverse range of university subject activities focused around a particular theme or topic for the day.

**Schools Conferences:** Support your pupils through significant transitions in their school life and give them the skills to unlock their future with our multi-school conferences for years 8, 9 and 11.

**Assemblies:** We are available to come into your school and give University information talks to entire year groups or more. Our talks are about 20 minutes long and are perfect for assemblies.

**Subject Taster Sessions:** We offer various subject tasters focused on engaging and introducing your pupils to university subjects and learning styles.

**Ignite:** Our Ignite programme provided sustained, focused support for a cohort of students from widening participation backgrounds, from year 7 through their school career.

**Activities for Looked After Children:** We offer on-campus events and bespoke campus visits for Virtual Schools during half terms and term time.



**[www.access-ed.ngo/coursebooks-partner/university-of-readings](http://www.access-ed.ngo/coursebooks-partner/university-of-readings)**



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